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LABORATORY EXAMINATIONS IN HEART DISEASE*

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When patients with actual or suspected heart disease consult their physicians they usually expect an answer to two important questions. First, "What is wrong with my heart?" Second, "Is it curable, and if so, how long will it take?" A thorough history combined with a complete physical examination of the patient usually gives the physician sufficient information to answer the first question.

A number of additional tests will give more exact information. Heart size is an important item. While this can often be determined by percussion and marked out on the patient's chest, it can be accurately recorded by the roentgen ray film. Care must be taken that the films are exposed during only one phase of respiration. Movements of the chest during breathing often spoil an otherwise good X-ray plate. The patient is instructed to hold his breath, preferably at expiration for the entire exposure of the film. Two meter X-ray plates will eliminate any distortion and give actual heart size. Fluroscopy adds an additional bit of information in that it shows the beating heart. It allows a careful study of the different chambers of the heart while at work. Not only can their

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size be determined but also their activity. In addition it permits tracing the outer border of the heart—orthodiagraphy.

These outlines of the cardiac borders or the frontal heart shadows have a definite relationship to other body measurements. Hodges and Eyster (1) have prepared tables for adults showing the influence of height, weight and age on heart size. Even moderate increases in area above the figures given from these tables for a given patient represent cardiac enlargement. This is a noteworthy bit of information as slight enlargement of the heart is very commonly an early sign of heart disease. By this method an accurate estimate of the area of a normal heart may be computed. Recently, the work has been extended and Hodges, Adams and Gordon (2) have established normal values for children. Much of the previous uncertainty, the result of unreliable methods of heart measurement, is avoided. Physicians have at their command accurate anatomic tables that permit scientific appraisal of heart size.

The duty of the heart is to propel blood through the lungs then on to the tissues. Normally this is done without our notice. When the heart is no longer able to perform this work with ease certain changes take place. Compensations are brought into play to insure an adequate circulation, but they impose additional burdens on the heart, lungs and blood stream. Often these changes are so slight that they are adequate for many years. When they fail quite obvious symptoms as: shortness of breath, swelling of the ankles, increase in pulse rate, cyanosis, etc., become evident. The occurrence of these symptoms is dependent upon two factors, the amount of effort the patient expends and the reserve of his heart. Ordinarily, the patients' activities are outlined and controlled by the physician. However, cardiac reserve is difficult to measure. Some patients are able to live within their reserve for a long time, others decompensate rapidly.

For this reason it is highly desirable to know a patient's cardiac reserve. It provides valuable information on the state of the heart from time to time and helps in predicting the likelihood of decompensation. It also is an excellent guide for both prognosis and treatment.

A great number of functional tests have been suggested in the past. Patients have been given definite amounts of work to do, asked to use a certain set of muscles, swing dumbells and hop up and down. Changes in the blood pressure and the pulse have been noted. Most of them have been unsatisfactory in that they produce emotional changes which spoiled the test.

An ideal test would be one that employed ordinary muscular

movements without causing excitement or symptoms. Drs. Master and Oppenheimer (3) have suggested a simple test of walking up and down stairs. It appears to fulfill all the necessary requirements. A special two step wooden block is contructed, each step being 9 inches high. Before the test is begun the patient is thoroughly rested in a sitting posture until the pulse rate and blood pressure are constant. About 10 minutes is required for the rest period. He is next asked to slowly walk up and down stairs for 1½ minutes at a uniform rate. Then he resumes his seat and the exact time noted when the pulse rate and blood pressure return to normal. The number of ascents are increased until the maximum is reached, which will still have the pulse and blood pressure return to normal after two minutes. A return of the pulse rate to within 5 beats and the blood pressure to within 5 mm. of Hg. of the original readings at rest are accepted as normal. Tables are appended to show the amount of work the normal person can do for a given height, weight and age. The test is easy to perform and it should never produce any symptoms.

The amount of work a person can do is dependent to a large extent upon the ease of respiration. This is in turn dependent upon the amount of air he can breathe into his lungs. Vital capacity is the greatest amount of air that a person can breathe into his lungs. The test is carried out by asking the patient to exhale as fully as possible, then to completely fill his lungs with air. He then empties his lungs by blowing air into a spirometer, which measures the amount of air deflated. False readings are found in nervous and incooperative patients. Most of these difficulties can be overcome by reasurring the patient and teaching him to breathe properly. Even though vital capacity is said to vary greatly in different persons, the figures given by West (4) of 2.5 liter for each square meter of body surface of men and 2 liters of vital capacity per square meter for women are standard. Very early in heart failure these figures are reduced. In most cases they parallel the degree of compensation and are much lower in severe cases. As the heart and circulation improves higher values are again obtained. It is of course essential that diseases of the lungs be excluded before reliance can be put on these figures.

Basal metabolism like vital capacity changes with the state of compensation. About two-thirds of patients suffering from heart failure show an increase of their basal metabolic rate. An average rise of 39% above the normal values of Du Bois have been noted by Drs. Hamburger and Lev (5). As the clinical picture of the patient improved the vital capacity increased and the basal metabolic rate was decreased. When the patient was worse the basal rate was elevated and the vital capacity reduced. These authors (6) have

suggested that the increased work of the heart and the increased activity of the muscles of respiration are largely responsible for the changes in metabolic rates.

It has long been recognized that oxygen utilization greatly affects metabolic rate, consequently oxygen changes are important. Oxygen saturation of the blood has been frequently measured. Blood is drawn under oil from a slit in the forefinger and its saturation measured. Normally there is a 94-96% oxygen saturation. During decompensation this is reduced greatly. An 80% oxygen saturation of arterial blood is not infrequent (7). Cyanosis is frequently seen when the oxygen saturation is reduced to 85% (8).

An explanation of this condition is found in the lungs. Fluid accumulates in the various body cavities and tissues in cardiac insufficiency. It starts in the legs and later it fills the lungs. In a normal person the oxygen of the air when taken into the lungs merely passes through a very thin membrane directly into the blood stream. An accumulation of fluid in the lungs changes conditions. Oxygen now must first pass through the fluid layer before it comes in contact with the blood stream. Transmission through the fluid layer is sufficiently slowed so as to prevent a part of the oxygen from reaching the blood. In many older patients an additional pathologic change of the lungs, emphysema further reduces oxygenation.

An enfeebled heart beat will reduce the speed of blood through the tissues. It has been often demonstrated that this slowing of blood flow allows more of the oxygen to be taken up by the tissues. These two or three processes combine to deprive the venous blood stream of its oxygen content. An 85-60% saturation with oxygen is normally present in venous blood. In decompensated heart patients it often drops to 50-30%. A return of compensation is followed by an increase of oxygen saturation of venous blood. Often it occurs before there are any symptoms of relief and it often indicates an early and successful treatment.

Tissues of the body to function properly must be bathed in an almost uniform unchanging solution—the blood. The acid-base balance prevents any significant changes in the acidity or alkalinity of the blood even in the presence of marked changes throughout the body. Carbon dioxide is being generated in the tissues from muscle metabolism. It is taken up in the blood and carried to the lungs. The continual accumulation of CO_2 make the lungs veritable reservoirs, from which CO_2 is constantly being washed out. So readily is the exchange made that the tension of CO_2 in arterial blood and alveolar air are the same.

Measurements of the carbon dioxide tension of alveolar air are easily done. After a series of forced respirations a sample of air is blown into a special container and analyzed according to the method of Fridericia (9). Samples of air taken near the end of expiration give values approximately equal to those of the CO_2 tension in arterial blood.

Carbon dioxide capacity or combining power of blood plasma is usually determined by the Van Slyke and Cullen method (10). A slowing of circulation usually causes an accumulation of CO_2 in venous blood. Special care must be taken in obtaining blood samples. Cold or an arrested circulation from a prolonged application of a tourniquet increase the CO_2 tension. The hand or arm should be thoroughly warmed before blood is withdrawn. Complicating nephritis is often responsible for a moderate acidosis or decreased CO_2 combining power.

Other blood tests are of value largely because they exclude complicating conditions or diseases. A red blood cell count and hemoglobin estimation will reveal the presence of an anemic or polycythemia vera. Infective processes give an increased polymorphonuclear leucocytosis and a "shift to the left" of the Schilling. The severity of rheumatic fever and chorea can be judged by the number of immature leucocytes. In sub-acute bacterial endocarditis the test is a valuable aid to prognosis. The filament non-filament count is of definite prognostic value in recent coronary artery occlusion. Less than 24% filament counts and less than a 2% eosinophile curve for the first 10 days after a coronary accident are seen in the cases that clear up favorably. High daily filament counts of 26 to 40% suggest an unfavorable outcome. According to Drs. Goodrich and Smith (11) these curves afford greater prognostic information of coronary occlusion than the leucocyte counts. Blood sedimentation tests give also valuable data concerning the severity of infections. The rate is accelerated in acute rheumatic fever, chorea and bacterial endocarditis. Chorea causes a very slight transient increase, while in rheumatic fever the increased speed of sedimentation follows closely the intensity of the infection. Decreasing rates are signs of a resolution of the disease process. However, some (12) believe that an increased rate is not an invariable indication of the infection. Serologic tests, Wasserman and Kahn, are often of assistance in establishing the presence of syphilis as a causative factor in heart disease. An increase in the total non-protein nitrogen, urea nitrogen, creatinine, and uric acid content of blood serum mean inefficient or diseased kidneys.

Changes in compensation of the heart are reflected in urinary changes. The onset of decompensation is characterized by the

accumulation of fluid in the tissues. Hence water goes to the tissues and the amount of urine is scant. With the clearing of this edema fluid (water in the tissues) large quantities of dilute, low specific gravity urine are passed. Kauffman (13) has devised a test that will demonstrate latent edema in cardiac patients. The patient must remain in bed during the entire test. He is given 150 cc. of fluid to drink hourly and requested to pass his urine hourly. One or two hours after awakening in the morning is the best time for testing, as it avoids physiologic diuresis. At the end of 4 hours the foot of the bed is raised 25 cm. and hourly samples are collected two hours later. All samples are carefully measured in amount and the specific gravity determined. Comparisons between the samples collected in the two positions are made. Normal subjects or markedly decompensated subjects with large fluid accumulations show almost no increase in urinary output. An increased urine secretion follows elevation of the feet in all cases of latent edema. These results have been frequently confirmed, so the test should be more widely employed.

Lastly, a word concerning electrocardiography. Changes in cardiac rhythm are too technical to be discussed at this time. Injury or damage to the heart muscle causes a variety of changes in the electrocardiogram. Elevation, notching or lengthening of the P wave mean auricular damage. Splintering, slurring, notching or prolongation of the Q-R-S complex beyond 0.12 sec, deviation of the S-T interval, flattening of the T-wave or an unusual appearance of the whole wave suggest heart muscle damage. Minor changes are hard to evaluate. It should be emphasized that the amount of heart damage and the degree of electrocardiographic distortion are not parallel.

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THE RELATION OF SERUM CHOLESTEROL TO BASAL METABOLIC RATE*

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Simple as it may seem from a technical viewpoint, the determination of basal metabolic rate is not always satisfactory, chiefly because it is frequently difficult to obtain the truly basic condition in which the patient's metabolism rate should be determined. Since full cooperation of the patient is an essential factor with all types of metabolors, the patient should be prepared for the test mentally as well as physically. Notwithstanding the fact that knowledge of thyroid function, and therefore determination of basal metabolic rate, is of primary diagnostic importance, this can only be approximated if done on children, mentally unbalanced individuals, or patients whose I.Q. is far below average. In such cases the determination of cholesterol is of greatest importance as an adjunct to the basal metabolic rate estimation in the study of thyroid function.

As early as 1922 Epstein (1) indicated an inverse ratio between blood cholesterol and thyroid function. Since that time many observers have confirmed his findings. Cholesterol is a necessary normal constituent of the blood and all body cells, occuring in the free state and in the form of esters. Chemically cholesterol is an unsaturated water-insoluble alcohol having the empirical formula $C_{27}H_{45}OH$. It is found in bile in the free state and apparently is concerned in the emulsification and absorption of fats in the intestine. In the blood, cholesterol is thought to be present in colloidal suspension or linked with blood proteins. In the body it is in part derived from that contained in ingested animal food, but the greater portion is formed by synthesis within the body (2). Its values are, relatively speaking, constant, being 120-150 mgs. per 100 cc. in plasma, and slightly higher in serum, 150-190 mgs. per 100 cc. About 60% of this cholesterol is present in the form of esters and 40% in the free state. Since differentiation is of no importance for clinical purposes, cholesterol is determined as a whole.

In various pathological conditions the amount of cholesterol in the blood may be decreased (hypocholesteremia), or increased (hypercholesteremia). Cholesterol is increased in cases of lipemia,

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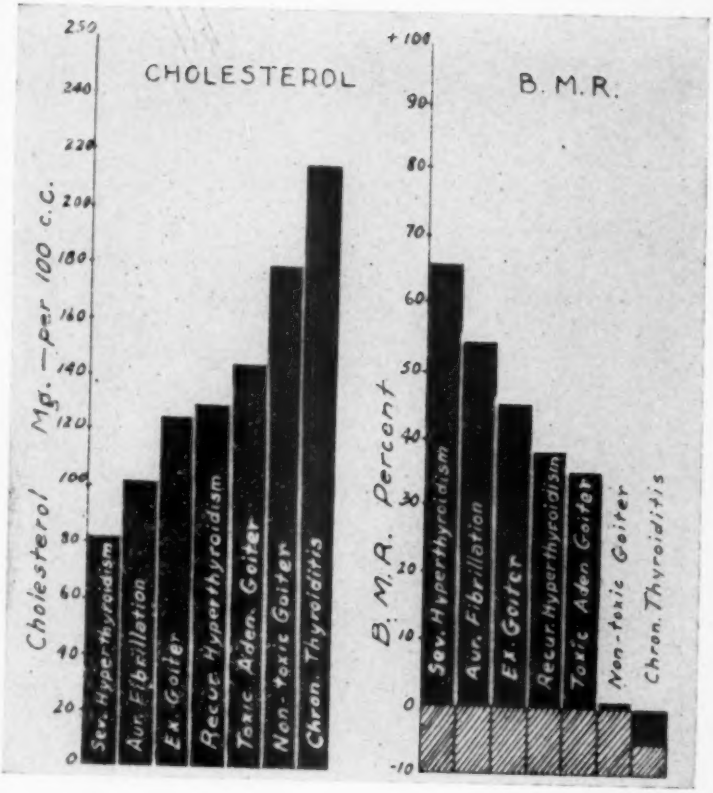
CHOLESTEROL
Cholesterol Mg. — per 100 c.c.
250
240
220
200
180
160
140
120
100
80
60
40
20
0
Sev. Hyperthyroidism
Aur. Fibrillation
Ex. Goiter
Recur. Hyperthyroidism
Toxic Aden. Goiter
Non-toxic Goiter
Chron. Thyroiditis
B.M.R.
B.M.R. Percent
+100
90
80
70
60
50
40
30
20
10
0
-10
Sev. Hyperthyroidism
Aur. Fibrillation
Ex. Goiter
Recur. Hyperthyroidism
Toxic Aden Goiter
Non-toxic Goiter
Chron. Thyroiditis

CHART 1

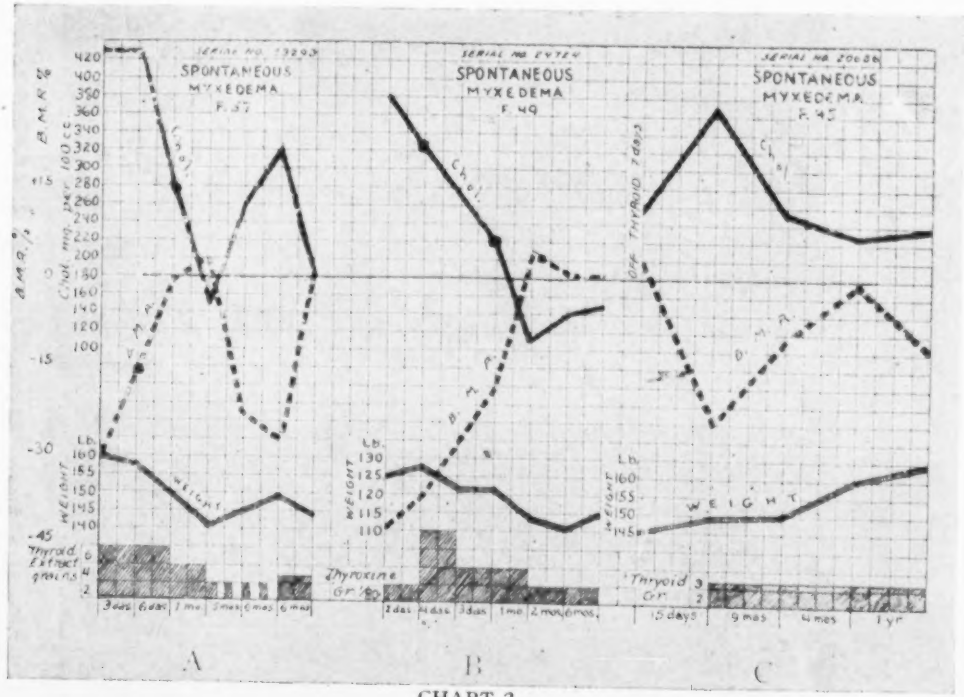
SERIAL NO. 13293
SPONTANEOUS
MYXEDEMA
F. 37
SERIAL NO. 24764
SPONTANEOUS
MYXEDEMA
F. 49
SERIAL NO. 20038
SPONTANEOUS
MYXEDEMA
F. 45
B.M.R.
Chol. mgs. per 100 c.c.
WEIGHT
Lb.
Thyroid Extract grains
Thyroxine Gr 1/50
Thyroid Gr
Off Thyroid 7 days
3 days
6 days
1 mo.
2 mos.
6 mos.
9 mos.
4 mos.
1 yr.
A
B
C

CHART 2

severe diabetes melitus, nephrosis, obstructive jaundice, and in the late stages of pregnancy. Decrease of cholesterol is found in various anemias, acute hepatic diseases, cachexia, and intestinal obstruction (3). Aside from these conditions, cholesterol value deviates from normal in hypothyroidism and hyperthyroidism. It is with these conditions the present paper is particularly concerned.

The cholesterol value is reversed in these conditions, that is, in hypothyroidism it is always increased, whereas in hyperthyrodism it is generally diminished, although occasionally it may be normal or even somewhat increased, particularly is this true if other conditions are concomitantly present.

Hurxthal (4) after careful analysis of many cases, and comparative study of basal metabolic rates and cholesterol, stated, "The level of blood cholesterol and the basal metabolic rate bear a reciprocal relationship when judged by average values." The increase of basic metabolic rate and the corresponding lowering of cholesterol value in hyperthyroidism is not only important in diagnosis, but in prognosis as well because of the direct relation of the factors, as can be shown from Chart I (from Hurxthal).

Cholesterol is especially decreased in, or immediately preceding so-called thyroid crises, and may be as low as 50 mgs. per 100 cc. The values of cholesterol were found to be increased and basal metabolic rate decreased as therapy was instituted and patients presented clinical improvement. The same author (5) also found that, "The relationship between the blood cholesterol and the basal metabolic rate is usually reciprocal when they undergo changes as the result of variations in the activity of the thyroid gland or thyroid substance of the body." According to this author, hypercholesteremia and not a low basal metabolic rate indicate thyroid deficiency. This reciprocal relationship can be clearly seen from the analysis of three cases illustrated on Chart 2 (from Hurxthal). In myxedema and other hypothyroid conditions, cholesterol values are invariably increased and may reach as high as 700 mgs. per 100 cc. (6).

To illustrate the statements made above, we would like to present a few case records:

CASE 1. H. G., female, 42 years. First BMR June 6, 1935, 0%; serum cholesterol 216 mgs. Cooperation only fair. The patient was given thyroid grains 1 per day. Second BMR July 16, 1935, —7%; cholesterol 181 mgs. Patient left the city and upon own initiative changed dosage to 3 grains of thyroid per day. October 3, 1935, BMR +35%; cholesterol 112 mgs.

CASE 2. C. J., colored female, 33 years. September 9, 1936: BMR —26%; cholesterol 226 mgs. Cooperation excellent. Thyroid therapy instituted. March 28, 1937: BMR —13%; cholesterol 196 mgs. October 11, 1937: BMR —6%; cholesterol 174 mgs. February 17, 1938: BMR —7%; cholesterol 181 mgs.

CASE 3. G. J., female, 37 years. July 30, 1936: BMR +62% (patient extremely uncooperative, reading calculated from two minutes of the respiratory curve); cholesterol 128 mgs. Subtotal thyroidectomy August 21st. December 27, 1936: BMR +21% (four minute reading); cholesterol 147 mgs. February 11, 1937, entire thyroid gland removed. June 9, 1937: BMR +9%; cholesterol 158 mgs. April 3, 1938: BMR +7%; cholesterol 270 mgs.

CASE 4. B. H., female, 29 years. Diagnosis Cushing's disease (basophilic adenoma of pituitary gland): BMR —37%; cholesterol 270 mgs.

CASE 5. Male, 57 years (insane): BMR +112% (reading made while restrained); cholesterol 83 mgs.

CASE 6. Male, 7 years: Had been receiving 5 grains of thyroid daily for past three months. April 12, 1938: BMR +38%; cholesterol 65 mgs.

In all our work we are using a modified Blor's method for determination of cholesterol. The technique is as follows: Into a 15 cc. centrifuge tube introduce 12 cc. of Blor's mixture (one part ether and two parts 95% alcohol). Slowly add 0.2 cc. clear centrifuged serum. Stopper the tube with a tinfoil wrapped cork, shake vigorously until precipitated proteins are evenly distributed along the sides of the tube, and place in a horizontal position for 30 minutes or longer. Centrifuge at moderate speed for 5 minutes and pour the supernatant fluid into a 25 cc. beaker or 50 cc. centrifuge tube. If desired, all subsequent operations may be carried out the following day provided the tube is well stoppered. The decanted fluid is evaporated practically to dryness in a water bath over an electric hot plate. To the remaining few drops add 2-3 cc. of chemically pure chloroform and evaporate again. Repeat this chloroform extraction at least two or three more times. After the last extraction take up the residue with 2 cc. of chloroform, and wash the tube twice with 1 cc. portions of chloroform. Transfer the extracted washings to a 15 cc. graduated centrifuge tube and bring the volume to 5 cc. with chloroform. Into a similar tube introduce 5 cc. of cholesterol standard. (This is prepared by dissolving 0.1 gram of

C. P. cholesterol in C. P. chloroform, making the total volume 50 cc. From this stock standard the working standard is prepared by diluting 2.5 cc. of the stock to 50 cc. with chloroform. This solution contains 0.1 mg. of cholesterol per cc.). To each tube add 2 cc. acetic anhydride and 0.2 cc. concentrated sulphuric acid. Stopper with rubber corks and mix by inversion. A green color appears almost immediately but the colorimetric reading is taken after five minutes. The following formula is used for calculation:

$$\frac{S}{U} \times 250 = \text{mgs. cholesterol per 100 cc. of serum.}$$

In the determination of cholesterol, it is very important that all glassware be absolutely dry, as the least trace of moisture in contact with chloroform will give a cloudy solution unfit for colorimetric reading. This method possesses important advantages over various other methods. It does not require special apparatus such as extraction flasks or extraction thimbles; the determination may, if necessary, be carried out in stages; the material for analysis does not require special preparation, such as the preparation of plasma, drying of blood with plaster of paris or on filter paper, and; only a small amount of serum is needed for the determination.

The simplicity of cholesterol determination and the importance of the interpretation of findings based on such a procedure, should be an inducive factor to incorporation of the determination of cholesterol in the series of "routine laboratory tests."

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RESISTANCE OF MONILIA TO ADVERSE CONDITIONS

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Introduction

Monilia are now generally recognized as the etiologic factor in a number of diseases. These yeast-like fungi have been isolated and proved to be the infecting organisms in diseases of the bone, gastro-intestinal tract, nervous system, respiratory tract, skin, sinuses, vagina and other organs of the body. Until recently they could not be recognized readily, but in the last few years quite a bit of work has been done along this line and they can now be identified comparatively easily. Very little however is known about their resistance to adverse conditions such as heat, chemical agents or fungicides. Stone and Garrod, 1931; Brehnam, 1931; Stoval and Bubolz, 1932; Wachowaik and associates, 1934; Lamb and Lamb, 1933 and 1935; Martin and associates, 1937, and Keiper, 1938.

Historical

McCrae, 1926, suggested a method for determining the fungicidal power of chemical agents whereby this property could be accurately determined and compared to that of other agents. Some work along this line has been done on various fungi, but very little, as far as is known, has been done on monilia. The writer first became interested in the study of monilia when he isolated these yeast-like fungi from a fatal case of broncho-monoliasis, Flinn and associates, 1935, and later at autopsy was able to recover these same fungi from both lungs and the brain. A few weeks later, two specimens of sputum containing monilia were sent to this laboratory for examination. This presented the problem of safely sterilizing the glassware and how to dispose of the contaminated material containing these parasites. Since most laboratories use cresol or mercuric chloride as a general disinfectant, these two were tested by a modification of McCrae's method to see their effect on monilia. Both were found to be quite moniliacidal.

Object and Scope

Believing that more of such information on the resistance of monilia to unfavorable conditions, heat and fungicides would be

valuable, this work was undertaken. Thirteen strains of monilia were tested with several adverse conditions, against 31 chemical agents and to different degrees of temperature for various intervals of time.

Methods

Medium

The medium used was Sabouraud's dextrose agar slants. The formula is as follows:

Dextrose	(Difco)	4 %
Peptone	"	1 %
Agar	"	1.8%

It was adjusted to a pH 5.6, sterilized for 15 minutes at 15 pounds. In order to have uniform slants as McCrae suggested only 16 x 140 mm. tubes were used.

Fungi Suspensions

The fungi suspensions were made by emulsifying the growth of a 24-hour old culture on Sabouraud's agar slants with 10 c.c. of sterile normal saline.

The Fungicidal Test

The fungicidal tests were performed as follows: Two c.c. of the chemicals to be tested were placed into small sterile test tubes. All solutions were prepared as aseptically as possible. To the 2 c.c. of the solutions were added 0.5 c.c. of the fungi suspensions. After exposure intervals of 1, 2, 5, 10 and 30 minutes, 2 loopsfuls of the mixtures were spread over the surface of Sabouraud's agar slants. The cultures thus made were incubated at 37° C. They were checked for growth in 24 hours, but if none was visible, they were incubated for several days longer and then checked again. Controlls were made on both the organism suspensions and on the chemical solutions. All tests were made in duplicate and chemically pure reagents were used.

Thermal Death Point

The monilia suspensions were prepared in the same manner as above. Two cubic centimeters of the suspensions were placed in small sterile test tubes. The tubes were then placed in water baths at 60°, 70°, 80°, and 93° centigrade. Because water boils at 93° C. at this altitude this temperature was used in the place of 100° C. After exposures of 5, 10, 15, 30 and 60 minutes to each of the above temperatures, 2 loopsfuls were transferred and spread over the

surface of Sabouraud's agar and incubated as above. The results are seen in table 2.

Results

A. Resistance of Monilia to Fungicides

1. Chemical agents that did not affect the fungi in 30 minutes;
   1% Basic Fuchsin (National Aniline and Chemical Co.)
   4% Mercurochrome-220 (Hynson, Wescot and Dunning)
   Saturated solution of Thymol (Merck)
   Saturdated solution of Chloretone (Parke, Davis and Co.)
   10% Potassium iodide (Baker's Analyzed)
   5% Potassium iodide (Baker's Analyzed)
   10% Sodium Carbonate (Baker's Analyzed)
   Saturdated solution of Boric Acid
   1% Phenol (Coleman and Bell Company)
   1% Sodium Benzoate
   1% Copper Sulphate (Baker's Analyzed)
   1:1000 Acriflavine (Abbott)
   1:500 Methylene Blue (National Aniline & Chemical Co.)
   0.25% Bismuth (Squibbs)
   5% Oxalic Acid (Baker's Analyzed)
   6% Neoarsphenamine (Squibbs)
   1:1000 potassium permanganate (Baker's Analyzed)
   10% Sodium Thiosulphate (Baker's Analyzed)
2. Chemical agents that killed in 1 minute:
   5% Silver Nitrate (Baker's Analyzed)
   10% Sodium Hydroxide (Baker's Analyzed)
   1% Cresol
   5% Cresol
   1:1000 Tinct. of Merthiolate (Lilly)
   1:200 Tinct. of Metaphen (Abbott)
3. Chemical agents whose effects varied with different strains:
   1:1000 Mercuric Chloride (Baker's Analyzed)
   1:500 Crystal Violet (National Aniline & Chemical Co.)
   1% Dilution of Tincture of Iodine
   10% Solution of Formalin (Coleman and Bell)
   Results are recorded in Table I.

B. Resistance of Monilia to Heat

See Table II.

C. Resistance of Monilia to Adverse Conditions

Strains No. 1 and 1A lived two years without being transferred.
Strain No. 2 lived four years without being transferred.
Strains No. 3, 6 and 21 died between one transfer period on 6 months.
Strains No. 1 to 8 remained alive in normal saline for thirty days.

All strains grew very well at room temperature, even when the temperature was as low as 50° F. (9.9° C.)

TABLE I. CHEMICAL AGENTS

Strain No.	1:1,000 Bichloride of mercury					1:500 Crystal violet					1% dilution of Tinct. of Iodine					10% Formalin				
	MINUTES					MINUTES					MINUTES					MINUTES				
	1	2	5	10	30	1	2	5	10	30	1	2	5	10	30	1	2	5	10	30
1	−	−	−	−	−	−	−	−	−	−	+	+	−	−	−	−	−	−	−	−
1A	−	−	−	−	−	−	−	−	−	−	+	+	−	−	−	−	−	−	−	−
1B	−	−	−	−	−	−	−	−	−	−	+	+	−	−	−	−	−	−	−	−
1C	−	−	−	−	−	−	−	−	−	−	+	+	−	−	−	−	−	−	−	−
1D	−	−	−	−	−	−	−	−	−	−	+	+	−	−	−	−	−	−	−	−
2	−	+	−	−	−	+	+	+	+	−	+	+	−	−	−	−	−	−	−	−
2A	−	+	−	−	−	+	+	+	+	−	+	+	−	−	−	−	−	−	−	−
6	+	−	−	−	−	+	+	+	+	+	+	+	−	−	−	+	−	−	−	−
3	+	−	−	−	−	+	+	−	−	−	+	+	−	−	−	−	−	−	−	−
4	+	−	−	−	−	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−
5	−	−	−	−	−	+	+	+	−	−	+	+	−	−	−	−	−	−	−	−
7	+	−	−	−	−	+	+	+	−	−	+	+	−	−	−	−	−	−	−	−
8	+	−	−	−	−	+	+	+	−	−	+	+	−	−	−	+	−	−	−	−

TABLE II. HEAT

Strain No.	60° C.					70° C.					80° C.					93° C.				
	MINUTES					MINUTES					MINUTES					MINUTES				
	5	10	15	30	60	5	10	15	30	60	5	10	15	30	60	5	10	15	30	60
1	+	+	+	+	+	+	−	−	−	−	+	−	−	−	−	−	−	−	−	−
1A	+	+	+	+	+	+	+	−	−	−	+	−	−	−	−	−	−	−	−	−
1B	+	+	+	+	+	+	−	−	−	−	+	−	−	−	−	−	−	−	−	−
1C	+	+	+	+	+	+	+	−	−	−	+	−	−	−	−	−	−	−	−	−
1D	+	+	+	+	+	+	+	−	−	−	+	−	−	−	−	−	−	−	−	−
2	+	+	+	+	+	+	−	−	−	−	+	−	−	−	−	−	−	−	−	−
2A	+	+	+	+	+	+	−	−	−	−	+	−	−	−	−	−	−	−	−	−
6	+	+	+	+	+	+	−	−	−	−	+	−	−	−	−	+	−	−	−	−
3	+	+	+	+	+	+	+	−	−	−	+	−	−	−	−	+	−	−	−	−
4	+	+	+	+	+	+	+	−	−	−	+	−	−	−	−	+	−	−	−	−
5	+	+	+	+	+	+	+	−	−	−	+	−	−	−	−	+	−	−	−	−
7	+	+	+	+	+	+	+	−	−	−	+	−	−	−	−	+	−	−	−	−
8	+	+	+	+	+	+	+	−	−	−	+	−	−	−	−	+	−	−	−	−

Discussion

The results of the fungicidal tests with the various chemical agents on the 13 strains of monilia studied showed that the common, so called, fungicides, thymol, chloretone, sodium benzoate, copper sulphate, sodium thiosulphate and fuchsin had no moniliacidal power even with a 30 minute exposure. The two common laboratory disinfectants, cresol and mercuric chloride, killed the fungi in about 1 minute. Three surgical and common household germicides, tincture of iodine, merthiolate and metaphen proved to be very moniliacidal, killing them in about 1 minute. If these tinctures are just as effective in vivo as they are in vitro, they should be very valuable in the treatment of monilia infections, especially superficial lesions.

Ten per cent formalin, 5% silver nitrate and 10% sodium hydroxide were also very fungicidal. Due to this fact, a sputum should not be digested with sodium hydroxide if it is to be cultured for Monilia.

A study of Table II reveals that a temperature of 60° C. does not kill these yeast-like organisms in 60 minutes. At 70° C. all are killed in 15 minutes and some in 10. At 80° C. all are killed in 10 minutes, but none in five. At 93° C. all are killed in 10 minutes and some in five. This shows that all glassware, etc., can be safely sterilized by boiling for ten minutes or longer.

Summary and Conclusion

1. The so called fungicides, thymol, chlorotone, sodium benzoate, copper sulphate, sodium thiosulphate and fuchsin are not moniliacidal.
2. Mercuric chloride 1:1000 and cresol 1% are very moniliacidal.
3. Tinctures of iodine, metaphen and merthiolate are very good fungicides for monilia.
4. Pasteurization does not kill monilia.
5. Boiling for ten minutes or longer kills these fungi.
6. Monilia cultures should be transferred oftener than six months.
7. Monilia grow well at room temperature.

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BOOK REVIEWS

A PRACTICAL GUIDE TO MASSAGE, by C. Irene Carpenter, Diplomee of the Chelsea College of Physical Education; Member of the Chartered Society of Massage and Medical Gymnastics; Member of the Almeric Paget Massage Corps., 1914-1918. With introduction by David Katz, Ph.D., Professor of Psychology and Education at the Högskola of Stockholm. 127 pages with 20 drawings. Publishers, William Wood and Company, 1937. Cloth, $2.00.

The author bases the reasons for massage on some of the fundamental principles of physiology. Her correlations are largely original and based on fact or theory. One may take exception to some of the author's ideas. Parts of the book are quite elementary but perhaps necessarily so to illustrate points the author is trying to make. She emphasizes that the human organism is an integral living entity and that the function of any part is conditioned by the organism as a whole. No technical details of massage are given.

There are three parts: I, physiological and other facts in relation to massage; II, the movements of massage and their effects; III, some typical medical conditions for which massage and the allied treatments are prescribed.

CLINICAL ATLAS OF BLOOD DISEASES, by A. Piney, M.D., M.R.C.P., Consulting Physician, International Clinic, Tunbridge Wells, Assistant Physician, St. Mary's Hospital for Women and Children, and Physician, West Central Settlement, London, Consulting Physician, Forest Hospital, Essex, and Stanley Wyard, M.D., M.R.C.P., Physician, The Royal Cancer Hospital, London, and Princess Beatrice Hospital. Fourth Edition. Publishers, P. Blakiston's Son & Co., Inc., 1012 Walnut Street, Philadelphia, 1938. Price $4.50.

This is a small text book of hematology with an atlas. There are 42 plates, most of them in color and with few exceptions the preparations were stained by the Jenner-Giemsa method. Except in one instance the magnification of all pictures is 1,000. A glossary of hematologic terms is included but is by no means complete. Inasmuch as the authors have found it impossible to include a detailed index the table of contents has been arranged in alphabetical order to facilitate reference.

In the text each blood disease or condition is considered under a definite plan, i.e., synonyms, symptoms, blood picture, complications, diagnosis, etiology, pathology, pathogenesis, prognosis and

treatment. One or more of these headings may be omitted in instances where little or nothing is known of the topic. All descriptions are written in brief handbook style. The book is intended to serve the busy general practitioner and others who require only a brief but fairly complete reference work of limited information on diseases of the blood. In this capacity it serves its purpose quite well.

THE RADIOLOGY OF PULMONARY TUBERCULOSIS by J. E. Bannen, M.B., Ch.B., D. M. R. E., Hon. Radiologist, Hull Royal Infirmary; Radiologist, Hull Corporation Hospitals and Tuberculosis Clinics, East Riding County Council and Raywell Sanatorium, Hull Corporation Mental Hospital, Willerby, Hull and Sculcoates Dispensary. 156 pages with 39 illustrations. Publishers, William Wood and Company, Baltimore, Md. Price $4.50.

This small volume, profusely illustrated with radiographs of the lungs, is a well written work which will be found quite useful by the radiologist doing institutional work as well as by the general practitioner with X-ray equipment. The technique of chest radiography is taken up in the first chapter with emphasis on the pitfalls to be avoided to obtain the best technical results. The normal lung is discussed in detail in chapter 2. The author states that there is no branch of radiology where a thorough knowledge of the normal is more essential than in chest radiology. Other chapters take up the pathogenesis of pulmonary tuberculosis, adult type, differential diagnosis, clinical aspects, pneumoconiosis and collapse thereapy. This book will be found to be of definite value to those who have only the occasional case of pulmonary tuberculosis as well as those concerned with this work exclusively.

MASSAGE AND REMEDIAL EXERCISES in Medical and Surgical Conditions. By Noël M. Tidy, Member of the Chartered Society of Massage and Medical Gymnastics; T.M.M.G.; late Sister-in-Charge of the Massage Department, Princess Mary's Royal Air Force Hospital, Halton. Third Edition, 1937. Pp. 456. Publishers, William Wood and Company, Baltimore, Md. Price $5.25.

In the preparation of this comprehensive work the author has drawn largely from her extensive experience in the field of physiotherapy. I believe that in this volume a detailed description of physiotherapeutic methods is given for every medical and surgical condition or disease in which such methods are of value. Fractures and dislocations have been dealt with in detail. Other conditions are far to numerous to list here but mention of a few of them will give some idea of the scope of the work: anaemia, hemophilia,

purpura; diseases of the respiratory organs as lobar and broncho-pneumonia, bronchiectasis, tuberculosis, asthma, pleurisy, empyema and many others; abdominal and pelvic conditions such as peptic ulcer, colitis, enteritis, constipation, disturbances of menstruation, enuresis, marasmus, etc.; other chapters take up heart diseases, blood and lymph-vessel diseases, the various forms of arthritis, deformities, functional and organic nervous diseases and others.

This work serves as an excellent guide and text for the graduate physiotherapist. It is a valuable source of information for the physician who directs or supervises the work. This responsibility properly belongs to the physician in charge and should not be shifted entirely to the physiotherapist. There is one criticism that should be made, namely, that a glossary explaining the terms used for the various exercises and positions should be included. This would enhance the value of the work for those unfamiliar with them and perhaps also for those who may use other terms for describing the same exercises and positions. Otherwise the book is highly recommended.

NEWS AND ANNOUNCEMENTS

REGISTRY OF MEDICAL TECHNOLOGISTS
OF THE
AMERICAN SOCIETY OF CLINICAL PATHOLOGISTS

Our friends will be pleased to learn that Doctor Philip Hillkowitz, Chairman of the Board of Registry, who recently underwent two serious operations, is fully recovered and is now taking a well earned rest in Florida.

The fall examination class has again been conducted throughout the United States, Hawaii, Puerto Rico, and Canada. Five hundred and fifty candidates were admitted to the class which was carried out under the direction of one hundred and forty-three examiners. Not only the Board of Registry and the applicants are grateful to these clinical pathologists for conducting these tests on such a high plane, but all registered Medical Technologists we feel take a just pride in the vocation which has the support of and is sponsored by the recognized Clinical Pathologists of the United States and Canada. These physicians carry out the semi-annual tests at a great sacrifice of time, materials and assistants, their only compensation being the satisfaction of helping in the program of the Registry to elevate the status of the Medical Technologist, certify those that are qualified through educational background, technical training and experience, and to eliminate the unfit.

The annual Roster of the Certificate Holders is again off the press and is now being distributed to every registered Medical Technologist and Fellow of the American Society of Clinical Pathologists.

The Exhibit of the Registry was used during the past month at the American Hospital Association meeting, at Dallas, Texas, under the supervision of Doctor George T. Caldwell, of Baylor University. Doctor Janet Caldwell presided at the exhibit during the sessions. The recently organized Arkansas State Society of Medical Technologists likewise presented the Registry exhibit as part of their program.

The next semi-annual examination of the Board of Registry will be conducted in the spring, the closing date for acceptance of applicants being March 15, 1939.

NATIONAL

COMMITTEE APPOINTMENTS

Constitution Committee:
Bernice Elliot, Chairman, Omaha, Neb.
Laura Bates, Woodstock, Ill.
Paul C. Brown, East Orange, N. J.

Program Committee:
Gladys Eckfeldt, Chairman, Newton, N. J.
Dorothea Zoll, Philadelphia, Pa.
Dorothy P. Morris, Hampton, Va.

Local Arrangements Committee:
Catherine A. Smith, Chairman, St. Louis, Mo.

Sisters Reservations and Entertainment Committee:
Sister Mary Irmena Olds, Chairman, Kansas City, Mo.
Sister Mary Heriberta Schedel, St. Louis, Mo.

Research Committee:
Anna M. Falck, Chairman, Lancaster, Pa.

Reception and Registration Committee:
Margaret J. Burgess, Chairman, Pana, Ill.
Esther Anderson, Wichita, Kansas
Dorothy Asher, Philadelphia, Pa.
Sister Mary Francis McRory, St. Louis, Mo.

Nominating Committee:
Marion Gianniny, Chairman, Lansdowne, Pa.
Olga Nelson, St. Paul, Minn.
Arthur Coad, Los Angeles, Calif.
Fanny Bell Warnock, Champaign, Ill.

Entertainment Committee:
Marion Baker, Chairman, Lufkin, Texas

Publicity Committee:
Ralph M. Carrel, Chairman, Sedalia, Mo.
Emma B. Wehrle, Marion, Ohio
Sally Lott, Whipple, Arizona
Florence Miesch Osborn, Chicago, Ill.

Committee on Awards:
Doctor J. J. Moore, Chairman, Chicago, Ill.

COUNSELLORS

New England States District—John Fitzgerald.....Portland, Maine
Maine, Massachusetts, New Hampshire, Vermont, Rhode Island, Connecticut.

Middle Atlantic States District—Doris Bowman.....Utica, N. Y.
New York, New Jersey, Pennsylvania, Maryland, Delaware.

South Eastern States District—Elizabeth Cramer.....Lexington, Ky.
West Virginia, Virginia, Kentucky, Tennessee, N. Carolina.
Lower South Eastern States District—Martha Moore.....
Jacksonville, Fla.
South Carolina, Mississippi, Alabama, Georgia, Florida.
East Central States District—Incomplete.
Ohio, Michigan, Illinois, Indiana, Wisconsin.
Lower Mississippi and Gulf States District—Marion Baker.....
Lufkin, Texas
Texas, Louisiana, Arkansas, Oklahoma, New Mexico, Kansas, Missouri.
West Central States District—Gertrude Ebers.....Lincoln, Neb.
North Dakota, South Dakota, Nebraska, Iowa, Minnesota.
North Western States District—Incomplete.
Washington, Oregon, Montana, Wyoming, Idaho.
South Western States District—Marie Hess, San Francisco, Calif.
California, Utah, Arizona, Nevada, Colorado.

EXPRESSION OF APPRECIATION FROM DR. HILLKOWITZ

American Society of Medical Technologists
Dear Friends:

I was deeply touched by the kind expressions of friendship and sympathy during my recent illness as evidenced by the flowers which reached me. The manifestation of affection and esteem on the part of my friends greatly cheered me and aided my convalescence.

Sincerely yours,

PHILIP HILLKOWITZ.

Minnesota

On June 11, 1938, the first meeting of the board of directors of the Minnesota Society of Technologists was held at St. Joseph's Hospital, St. Paul, Minn. Eight out of the nine members were present. The following committees were then announced:

Membership Committee—Miss Agnes Thielen, chairman; Miss Elizabeth Maclay, Sister M. Digna Arends, Miss Mae Collins.

Nominating Committee—Miss Vivian Grinager, chairman; Miss Florence Hedren, Miss Bernice Bache.

Education and Program Committee—Miss Dorothy Wilkins, chairman; Grace Hitchcock, Grace Oyen, Frieda Claussen.

Finance Committee—Miss Bergloit Hansen, chairman; Mr. Charles Haver, Miss Agatha Caylor, Miss Grace Zschische.

Standards and Studies Committee—Mr. C. H. Winbigler, chairman.

The privilege is extended Mr. Winbigler to choose his own committee.

The Board decided that the Minnesota Society should publish a periodical containing news items, announcements, questions and answers and a corner reserved for the employment bureau. The paper is to be issued every three months, the Constitution providing for the editors. Other business that came before the Board concerned membership, revising of the Constitution and By-Laws, and remuneration for travel by the officials of the Society.

South Dakota

The fourth annual convention of South Dakota Society of Medical Technologists was held at the Alex Johnson Hotel, Rapid City, South Dakota, Sept. 10 and 11. Dr. Hillkowitz was engaged as guest speaker but was unable to come because of unexpected illness. Dr. Ikeda very kindly agreed to take his place.

Highlights of the program were: Address of welcome, Mayor Hill; Discussion of Technologists' Problems, Dr. Ohlmacher; The Place of the Technologist in Regard to the Medical Profession, Dr. Ikeda; Importance of Fractional Gastric Analysis, Dr. Morse; Round Table Discussion conducted by Dr. Ikeda; Luncheon at 1:00 p. m., Alex Johnson Hotel; Tour to the S. D. School of Mines Museum; Tour to Mt. Rushmore.

A group of questions were submitted by the respective members for the round table discussion. We are very grateful to Dr. Ikeda for his aid in clearing up many troublesome matters.

Dr. Ohlmacher, distinguished guest from our own State, discussed our problems here in South Dakota. It was rumored that he and our other very honorable guest, Dr. Ikeda, may arrange a sort of Tech. Institute to b eheld at the State Laboratory. However, no official announcement was made.

Officers for the coming year are: Sister M. Mildred, President (St. Joseph's Hosp., Mitchell, S. D.); Samuel Crabb, Vice-President (Black Hills Meth. Hosp.), Rapid City; Oretta Axtell, Secy.-Treas. (St. John's Hosp., Rapid City).

Place of meeting, Mitchell, South Dakota.

Time of meeting, Sept. 9, 1939.

Many members were present and among the non-members was our Honorable President of the State Nursing Board, Miss Carrie Clift, R. N.

North Carolina

The North Carolina Technologists organized a state society on April 23, 1938, and elected the following officers: President, Miss Mittie Pickard, Chapel Hill; Vice-President, Mrs. John M. Harry, Fayetteville; Secretary, Miss Jerrie Arthur, Charlotte; Treasurer, Miss Grace Freeland, High Point.

Minutes of the Executive Sessions of the Sixth Annual Convention of the American Society of Medical Technologists held at Young Men's Institute Building, San Francisco, Cal., June 13-14-15, 1938

(*Continued from Vol. 4, No. 5, September, 1939*)

Mr. Brice read the resolution concerning state licensure in California and asked for its adoption. This motion was seconded by Miss Stanley and carried unanimously.

Mr. Conlin brought to the attention of the Society the matter of taking over the exclusive distribution rights of the Technical Supplement of the Journal of the American Society of Clinical Pathologists. This would be distributed to the members with the Society's Journal for the present dues. He stated that the idea had the support of the Board of Registry. "Exclusive distribution" would mean that all subscriptions would be handled by the Administrative Office. The publisher, Williams and Wilkins Company, reserved the right to complete the present subscriptions. Mr. Conlin asked that the membership go on record as approving such measures so the matter could be referred to the Executive Committee and approved in time for the July issue. Next came the problem of financing but as the treasury would contain some $800 at the close of the convention this was soon passed over. Mr. Conlin felt that if one dollar of the four dollar dues went to a Publication Fund it could be done. The Supplement would cost sixty cents a year per person. Considerable discussion followed. It was discussed and decided that such an arrangement of the dues would not cripple the Society financially. The matter of the binding of the Supplement was brought up. It cannot be bound with the Journal because it is copyrighted by the American Society of Clinical Pathologists. It was asked if such a measure would be binding or if the Society could drop it if it wasn't satisfactory. Mr. Conlin stated the contract would be for an indefinite period—permanent. It was also brought up and decided that the Supplement would in no way duplicate our Journal. Miss Stanley made a motion that the Society go on record as approving that one dollar of the four dollar dues be used to supply the Supplement to each member. Mr. Brice seconded the motion. The discussion continued and several members expressed their approval of such a measure. It was decided that the motion was not explicit enough. Miss Stanley withdrew her motion, the second was withdrawn and the following motion was presented by Miss Stanley—that this Society go on record as recommending to the Executive Committee the approval of transferring one dollar out of the annual dues to be used as a Publication Fund to take over the exclusive distribution rights of the Technical Supplement of the

Journal of the American Society of Clinical Pathologists and to supply the Supplement to each member. The motion was seconded by Mr. Brice and carried unanimously.

Miss Stanley made a motion that the President appoint a committee of three members to work on the revision of the constitution that they should present to the membership such revisions by November of this year. In this way members could send in their suggestions or revisions, the Committee could make any rearrangements and send them to the membership sixty days prior to the next convention. This would also give a voice to those members not able to attend the convention. It was stated that any drastic changes would be expensive as the Society is incorporated. The motion was seconded by Mr. Brice and carried. Mr. Fitzgerald suggested that members send in any ideas concerning the revision of the constitution but that was the duty of the incoming president to handle the situation.

The election followed. Miss Stanley of New Jersey and Sr. Euthalia Graf of Nebraska were appointed tellers. Mr. Fitzgerald was appointed Sergeant-At-Arms. The result of the election was as follows:

President-Elect—Bernice Elliott, 15; Gladys Eckfeldt, 7.

Vice-President—Arthur Coad, 17; Marion Gianniny, 5.

Secretary—Lucille Brown Wallace, 21; Doris Bowman, 1.

Executive Board—Arthur Brice, 17; Ann Snow, 14; Sr. M. Irmena Olds, 9; Pauline Dimmitt, 4.

Advisory Board—Frieda Ward, 15; Laura Bates, 7.

Mrs. Seguin suggested that certificates for honorary members be printed instead of written and that a different grade of paper be used. Mr. Brice felt it needed no motion as the matter was in the hands of the Administrative Secretary and that he should use his discretion.

Mr. Fitzgerald moved that the meeting be adjourned. It was seconded and carried.

WEDNESDAY EVENING, JUNE 15, 1938 (Banquet):

The annual banquet was held June 15, 1938, at 6:30 p. m. in the Richelieu Hotel. Miss Frieda Ward substituted as toastmistress for Miss Marian Baker who could not be present.

The first speaker was Dr. Davidsohn of Illinois, a member of the Board of Registry, who gave us an interesting little talk on "The Definition of a Clinical Pathologist."

Dr. Ikeda, also a member of the Board of Registry, announced the awards as follows:

Silver Medal—Miss Ida Lucille Brown—"Type Incidence of Pneumococcus Infections in Oklahoma."

Bronze Medal—Miss Phyllis Stanley—"The Museum in the

Small Hospital."

Bronze Medal—Miss Dorothy Asher—"Studies in Experimental Dehydration."

Dr. Maynard, ex-president of the American Society of Clinical Pathologists, was our next speaker.

Dr. Hillkowitz, chairman of the Board of Registry, spoke and told us how pleased he was with the interest shown in post-graduate study.

Dr. Foskett, a member of the Board, spoke as did Dr. Kracke, Mrs. Anna R. Scott, Dr. Konzelmann and Dr. Benner.

A roll call followed showing seventeen states represented.

Mrs. Christine Seguin, the incoming President, gave her address.

Miss Bernice Elliott, president-elect, was introduced, after which all officers were introduced.

The banquet was closed by the toastmistress, Miss Ward.

WEDNESDAY EVENING, JUNE 15, 1938:

A meeting of the new and old officers was held at the Palace Hotel immediately following the banquet.

New officers were instructed in their duties.

Bills were turned in, approved and paid.

Mrs. Seguin made a motion which was seconded and carried that a resolution be added thanking Miss Stanley for the favors at the banquet, which were gardenias.

The idea of sending a copy of the Supplement with a copy of the Journal complimentary to all registered technicians was discussed. This was decided to be too expensive. It was questioned how technicians were to know about the Supplement. A discussion followed concerning sending cards to all registered technicians to inform them. It was deemed best to leave such advertising to the counsellors.

The Administrative Secretary received approval of his request to have shelves made to help in the storage problem.

It was decided that the Treasurer should send one quarter of each three months' receipts to the Administrative Secretary.

The meeting closed after the President said she would welcome any suggestions any member might have during the year.

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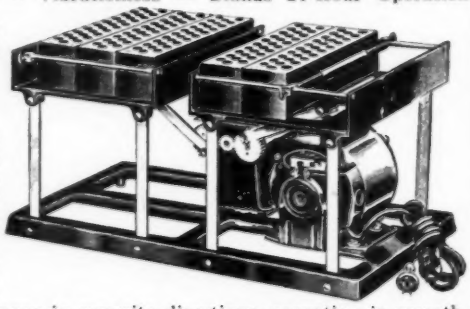

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